Armed Forces College of Medicine

AFCM

Endocrine System

Thyroid gland

&

Parathyroid gland

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INTENDED LEARNING OBJECTIVES (ILO)

By the end of this lecture the student will be able to:

1. Explain the structure of thyroid –parathyroid and pineal glands
2. Relate the defective structure of the thyroid-parathyroid-pineal glands' cells to different clinical conditions

Lecture Plan

1. Part 1 (5 min) Introduction
2. Part 2 (35 min) Main lecture
3. Part 3 (5 min) Summary
4. Lecture Quiz (5 min)

Thyroid gland

Thyroid gland

- General appearance:

- Single, anterior to the trachea, formed of two lobes connected by an isthmus

- Structure:

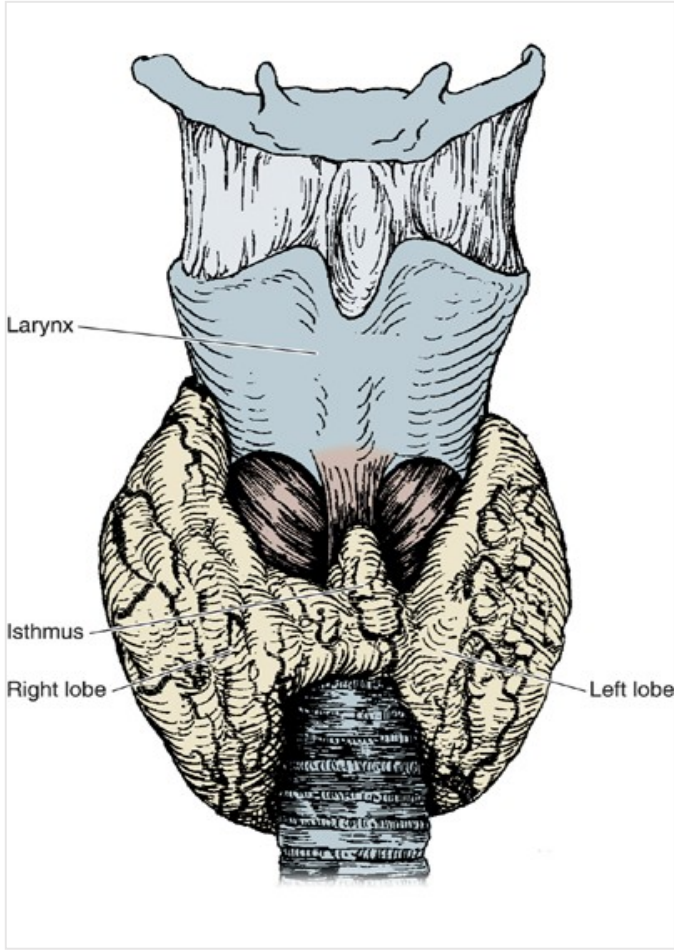
- **- Stroma** :- Capsule - C.T septa – reticular C.T

- - **Parenchyma:-** (cells & fenestrated blood capillaries)

- - Cells are arranged as;

- 1)Thyroid follicles

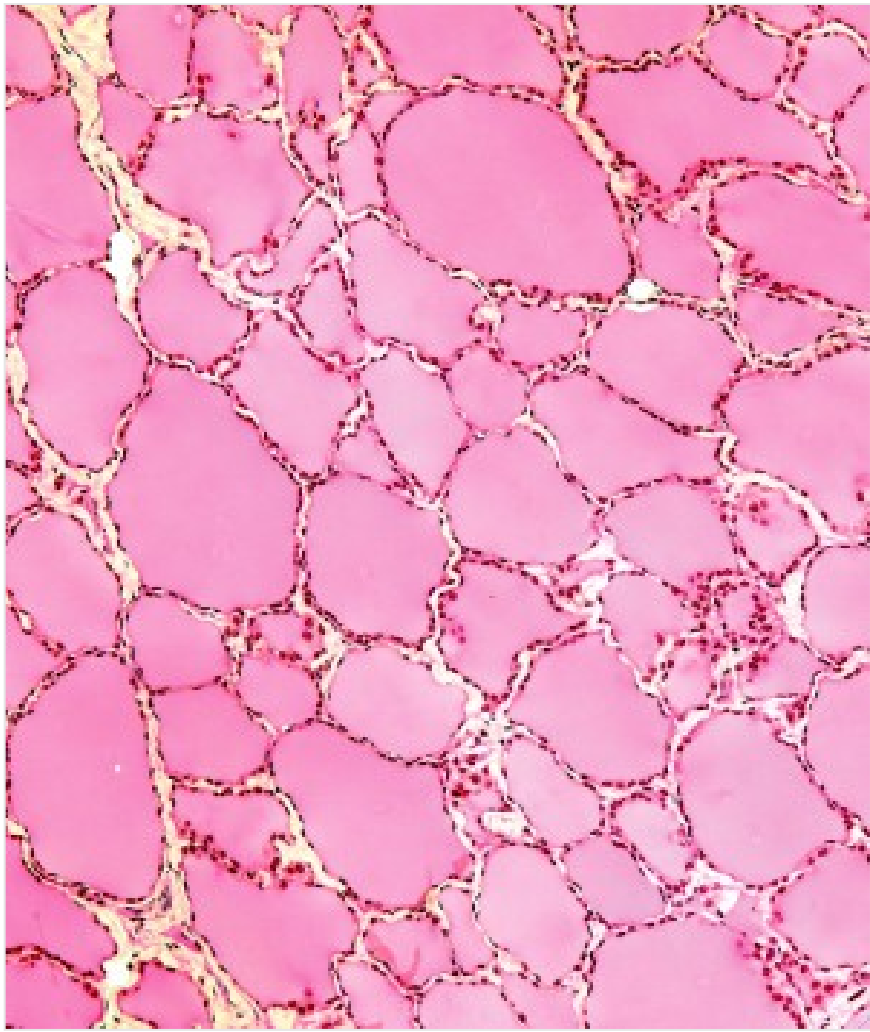
- 2) Interfollicular cells



Thyroid follicles

- Spherical cysts surrounded by basal lamina, lined by simple cuboidal epithelium (Follicular epithelium) and filled with colloid.

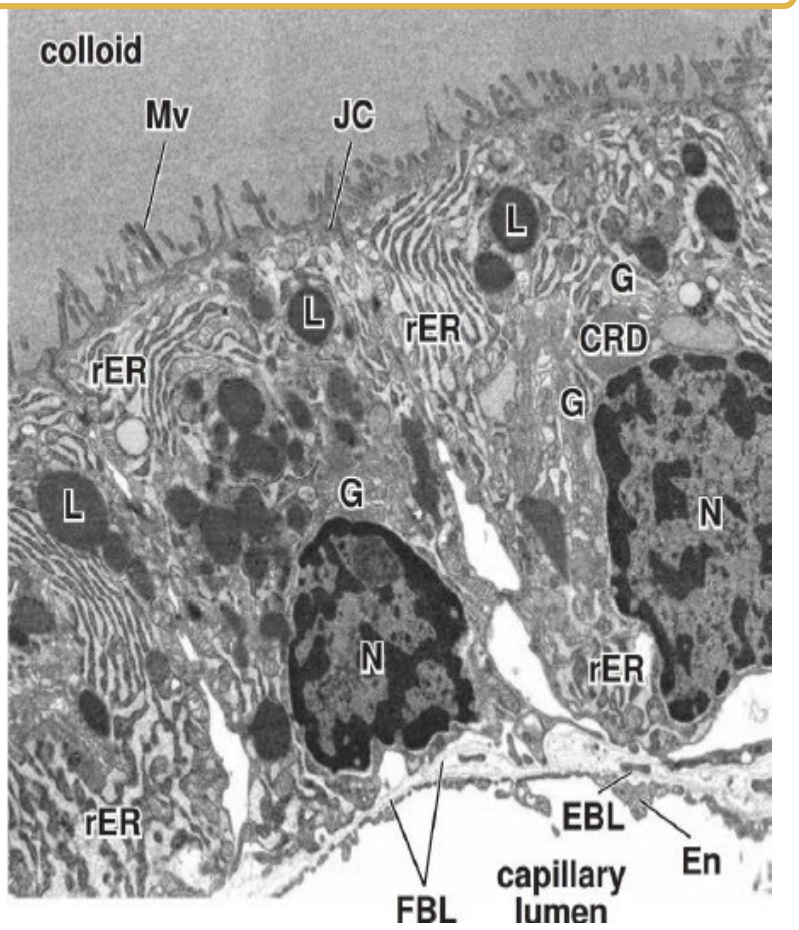
- -Follicular epithelium consists of **2 types** of cells: **Follicular cells** & **parafollicular cells.**



Follicular cells

- - Also called **principal cells.**
- Responsible for T3 & T4 production.
- **L/M:** Cuboidal cells- basophilic cytoplasm- rounded nucleus with prominent nucleolus.

- **E/M:**-Supra nuclear golgi- basal RER - Endocytotic vesicles (phagosomes) - Lysosomes.
- Junctional complexes - Short microvilli.
- Lipid droplets & PAS +ve droplets

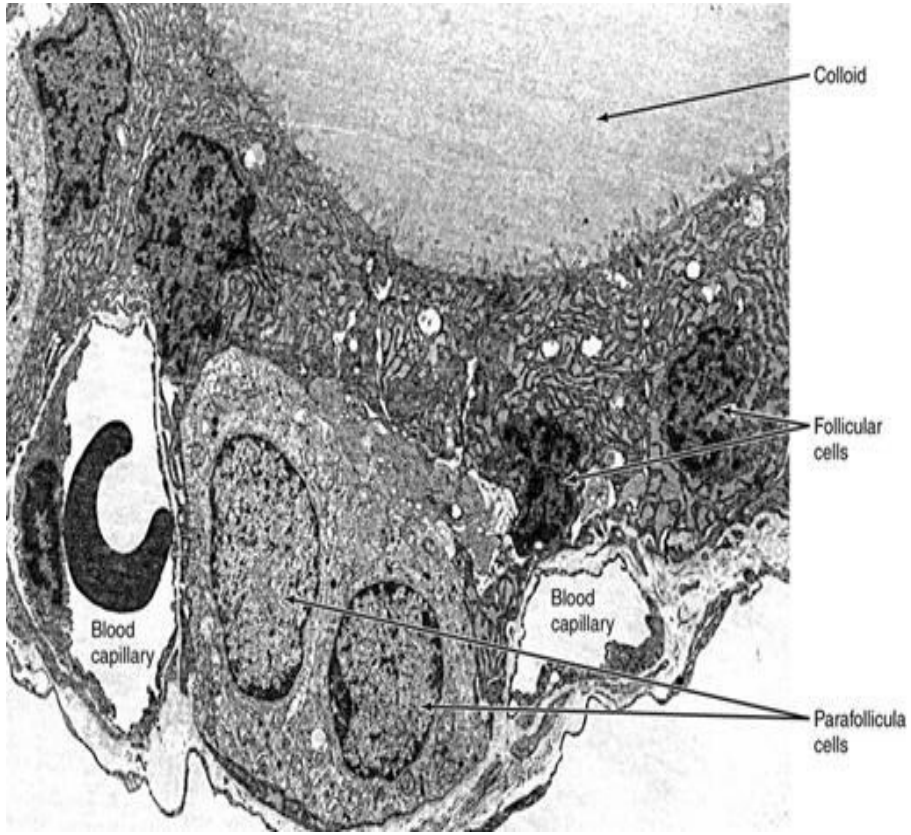


Follicular cells are under control of TSH secreted from the pituitary gland

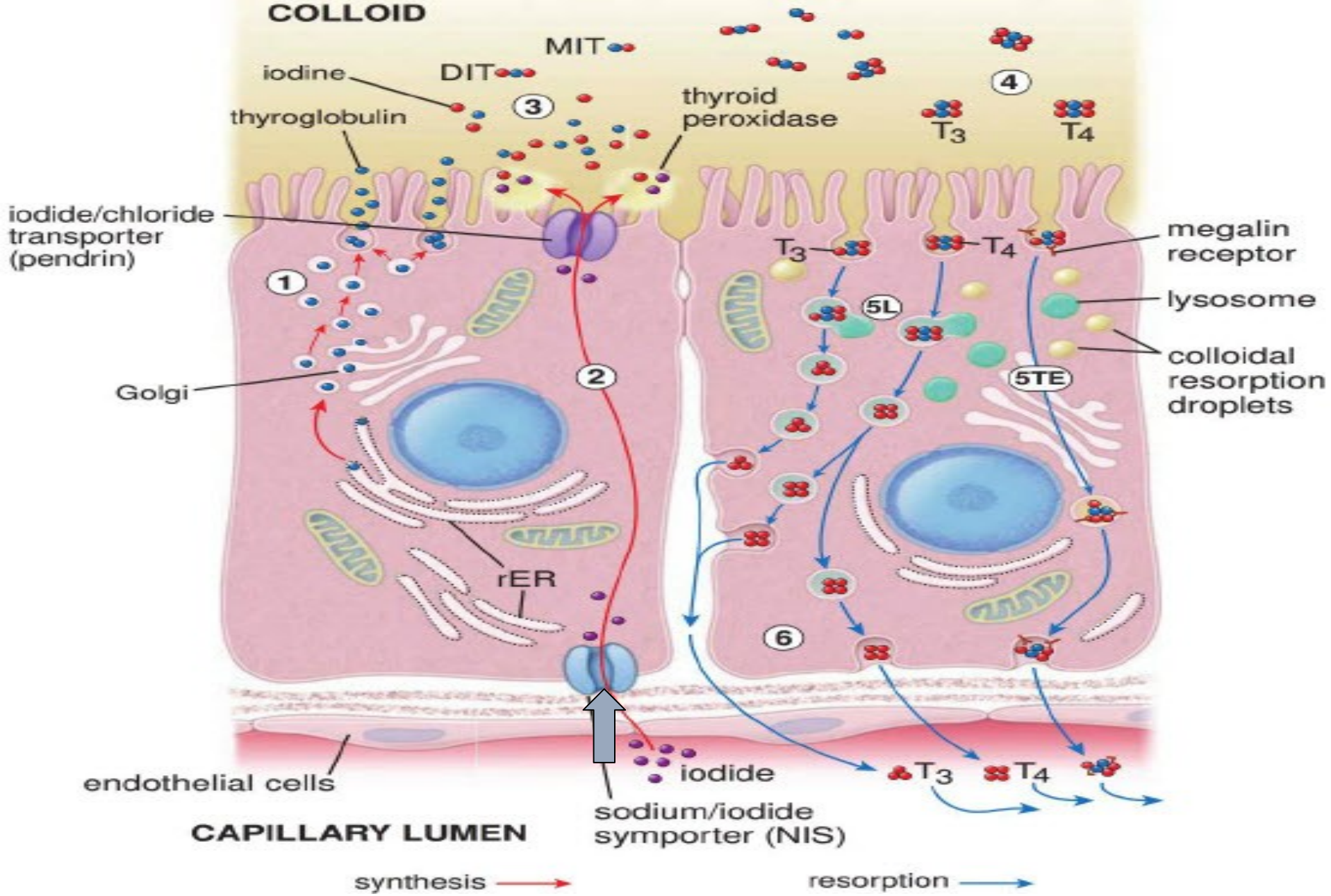
Parafollicular cells (C- cells)

- Lie within the follicular basal lamina or isolated clusters bet. follicles.

- - Derived from neural crest.
- **L/M**: Pale- large.
- **E/M**: numerous small secretory vesicles- prominent Golgi- less amount of rER
- Secrete ***Calcitonin***



Calcitonin lowers Ca blood level through inhibition of osteoclast activity and stimulation of ca deposition.



Mechanism of thyroid hormone production

Steps of thyroid hormone synthesis

- 1- Synthesis of thyroglobulin (exocrine)
- 2- Uptake of iodide
- 3- Iodide pump into the follicle lumen
- 4-Oxidation of iodide to iodine (thyroid peroxidase)
- 5- Iodination of thyroglobulin
- 6-Endocytosis of iodinated thyroglobulin (pinocytosis – receptor mediated endocytosis)
- 7- Fusion with Lysosomes
- 8- Release of T3 and T4 (endocrine)

Thyroid gland

- **T4 represent 90% of the circulating thyroid hormones, however T3 is more potent.**

- **Both thyroid hormones increase number & size of mitochondria enhance metabolic activity.**

Clinical applications

Thyroid disorders are either:

Hypothyroidism

- Caused by inflammation or decrease in TSH from pituitary.

- Manifested by : Tiredness- weight gain- cold intolerence- decreased ability to concentrate.

Hyperthyroidism

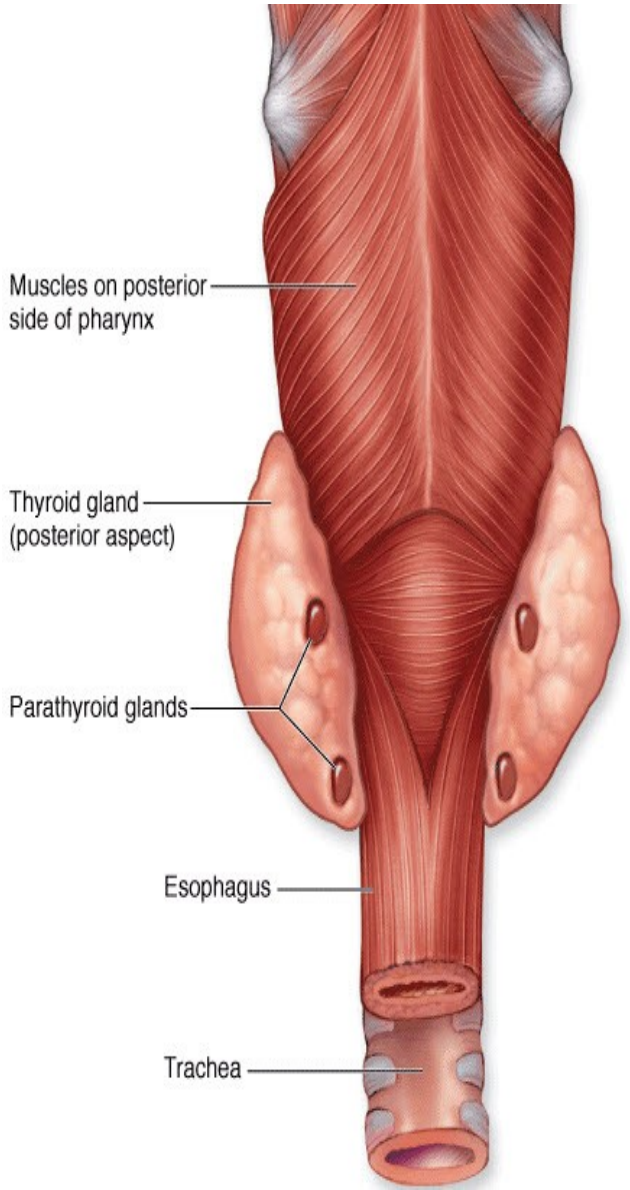
e.g.: *Grave's disease:* autoimmune disorder, antibodies stimulates follicular cells to produce thyroid hormones.

- Manifested by: weight loss- nervousness- sweating- heat intolerence

Parathyroid gland

Parathyroid gland

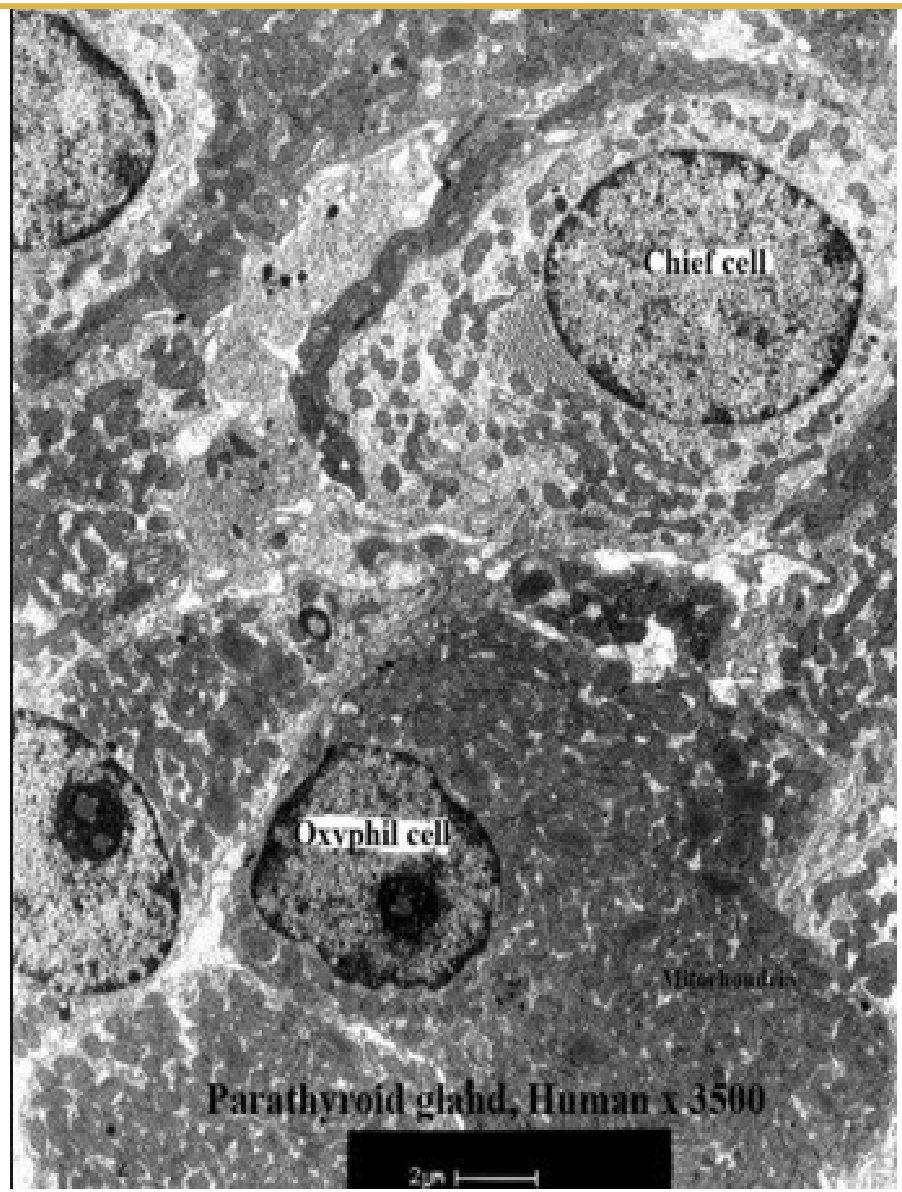
- Four small masses on the back of the thyroid glands.
- Covered by CT capsule and reticular stroma.
- Parenchyma is formed of 2 types of cells:
- 1- **Chief (principle) cells.**
- **2- Oxyphil cells.**



Chief cells

- Small polygonal – rounded nuclei – pale acidophilic cytoplasm.

- Their cytoplasm contains irregular granules of parathyroid hormone (PTH)



Parathyroid gland

Both **chief cells** and **parafollicular cells** are **not** under control of pituitary gland but under control of **blood calcium level**

Oxyphil cells

- Fewer in no. & larger in size than chief cells.
- Ccc by deep acidophilic cytoplasm & abnormal mitochondria
- More common in older people.
- - Represent transitional derivatives of chief cells

Lecture Quiz

What hormone is produced in response to decreased blood calcium levels?

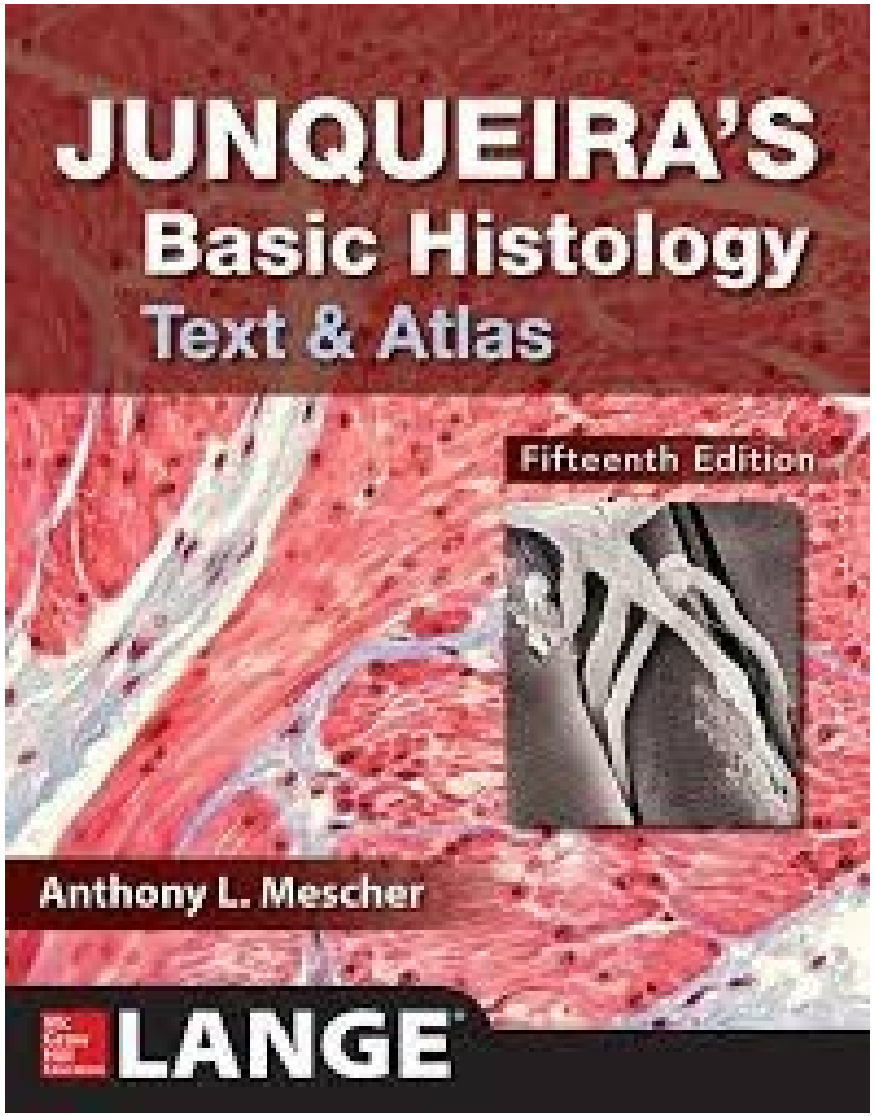
a. Pancreatic polypeptide
b. β-endorphin
c. Somatostatin
d. Calcitonin
e. PTH

Lecture Quiz

Secretion, chemical modification and storage, reuptake, and digestion of a protein occur in epithelial cells of what endocrine tissue?

a. Neurohypophysis
b. Adrenal medulla
c. Adenohypophysis
d. Thyroid gland
e. Neuroendocrine cells in the duodenum

SUGGESTED TEXTBOOKS



Chapter 20: Endocrine glands.
Pp. 429-437